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In our discussion of the Nuclear Posture Review and the New Triad, we have thus far been able to ignore the dimension of time. But for the stockpile and the infrastructure, we can't do that. We can change our policy to embrace assure, dissuade, deter and defeat in a day. We can make operational and targeting changes to implement that policy in weeks or months. In a year or so we can improve integration of nuclear and non-nuclear offense and of offense and defense. In a few years we can develop new defensive and non-nuclear capabilities.

In contrast, the infrastructure and the stockpile it can support both change far more slowly. Full infrastructure changes may take a couple of decades. This in turn limits our ability to transform the stockpile. A concrete example: If, as most of us assume, the Reliable Replacement Warhead requires a different, remanufactured pit and if everything works as we hope, we might be able to produce forty pits a year starting in the next decade. Greater production must await a Modern Pit Facility, which won't be available for at least 15 years. So fully implementing the Responsive Infrastructure portion of the New Triad will take a while.

This fact of life means that a Responsive Infrastructure isn't particularly relevant to Iran or Korea. It isn't particularly relevant to the nuclear terrorism concerns discussed in yesterday's final panel. But in the long run it may be the most important element of the new Triad. The combination of a Reliable Replacement Warhead and a truly responsive infrastructure—each enabled by the other—may genuinely be transformational. So while we wrestle with the important near-term questions discussed yesterday, we need to also focus on the longer-term promise of a transformed stockpile and infrastructure. After all, a great nation ought to be able to work on two problems at once.

If we were starting to build the stockpile from scratch today we would take a much different approach than we took during the Cold War. First, today's stockpile is the wrong stockpile *technically*. Most current warheads were designed to maximize explosive yield with minimum size and weight so that many warheads could be carried on a single delivery vehicle. As a result, weapons designers designed closer to the so-called "cliffs" in performance. If we were designing the stockpile today, we would manage risk differently, trading size and weight for increased performance margins and ease of manufacture and maintenance.

Second, the legacy stockpile was not designed for longevity. During the Cold War we introduced new weapons routinely , turning over most of the stockpile every 15-20 years. Today, our weapons are aging and now are being rebuilt in life extension

programs that are both difficult and costly. Rebuilding nuclear weapons will never be cheap, but Cold War decisions to use certain hazardous materials mean that, in today's health and safety culture, warheads are much more costly to remanufacture.

We may have the wrong stockpile militarily, with the emphasis on high yield to weight ratios. We certainly have the wrong stockpile politically; even with the President's unprecedented reductions last year, the stockpile—especially the component we keep in reserve as a hedge against technical or political problems--is probably too large.

Finally, today's stockpile is the wrong stockpile from a *physical security* standpoint. During the Cold War the main security threat to our nuclear forces was from espionage. Today, that threat remains, but to it has been added a post-9/11 threat of well-armed and competent terrorist suicide teams seeking to gain access to a warhead in order to detonate it in place. This change has dramatically increased security costs. If we were designing the stockpile today, we would apply new technologies and approaches to warhead design as a means to reduce physical security costs.

Fortunately, we know what to do about all of these problems.

Let me take you forward 20 or 25 years when the Administration's emerging vision for the nuclear weapons enterprise of the future has come to fruition. The deployed stockpile—almost certainly smaller than today's plans call for-has largely been transformed. Reliable Replacement Warheads have relaxed warhead design constraints imposed on Cold War systems. As a result, they are more easily manufactured with more readily available and more environmentally benign materials. These modified warheads have the same military characteristics, are carried on the same delivery systems, and hold at risk the same targets as the variants they replaced, but they have been re-designed for reliability, security, and ease of maintenance. As a result, even though there is almost no one left in the complex who remembers a nuclear test, let alone has conducted one, confidence in the stockpile is high because of the RRW design with its very large margins, because of a deep understanding of nuclear phenomena from first principles enabled by Stockpile Stewardship and the high-technology tools that come with it, including the growing use of simulation, which has joined theory and experiment as fundamental pillars of the scientific method.

The deployed stockpile is backed up by a much smaller non-deployed stockpile than today. The United States has met the Responsive Infrastructure objective that for a relatively minor problem, we be able to deploy warheads modified to overcome the problem within one year. The elimination of dangerous and environmentally difficult materials like conventional high explosives and beryllium has made this possible and obviated the need for large numbers of spare warheads to deal with reliability problems.

The world has not gotten more predictable in twenty-five years. We still worry about a hedge against geopolitical changes and attempts by others to instigate an arms race. But that hedge is no longer in aging and obsolete spare warheads but in the Responsive Infrastructure. Once again we have met the goal established in 2004 of

being able to produce additional warheads in three to four years, well within the time of plausible geopolitical change.

In the same manner, we can produce weapons with new or modified military capabilities if required. The weapons design community that was revitalized by the RRW program can adapt an existing weapon within 18 months and design, develop, and begin production of a new warhead within 3-4 years of a decision to enter engineering development—goals that were established in 2004. Thus, if Congress and the President agree, we can respond quickly to changing military requirements.

Security remains important in this future world. But the transformed infrastructure has been designed with security in mind. More importantly, new, intrinsic features built into the growing number of Reliable Replacement Warheads have improved both safety and security. In short, the vision I am setting forth is of a world where a smaller, safer, more secure and more reliable stockpile is backed up by a robust capability to respond to changing technical, geopolitical or military requirements.

This isn't the only plausible future of course. We may decide that we need to hold on to today's entire stockpile, that we are unwilling to take the risk of reducing life extension programs and spare warheads to free up resources for transformation. What would that future world implied by those decisions be like?

The twenty-year accumulation of small uncertainties has led to reduced reliability of individual warheads. We compensate by increasing the use of multiple warheads on a single target, thus keeping deployed levels high. With no ability to respond to geopolitical changes or technical problems, we continue to maintain a large hedge of non-deployed warheads. They have the same aging problems as the deployed systems, but they are all we have. Because we didn't take advantage of building in intrinsic security to modified warheads, we continue to depend on a costly and demanding denial strategy to ensure security. As uncertainty over the reliability of our warheads grows, the political purposes of retaining nuclear weapons, however they are articulated in 2025 or 2030, become more difficult to achieve. An IFPA conference calls for transformation, but without the stimulus of the RRW program, our design abilities have atrophied.

This second future is not all bleak. The tools of stockpile stewardship continue to let us understand the stockpile better. Uncertainty in reliability has increased, but perhaps not catastrophically. The inability to respond to geopolitical or technical changes may be less important than we think. Warhead security is good today; it may not get better but it won't get worse. Still, this future at a minimum increases risk and is rife with lost opportunities.

Let's return to today. I've set forth two visions of the future. The one we are embracing is the vision of transformation. We should not underestimate the challenge of transforming the enterprise but it is clearly the right path for us to take.

Once we establish a responsive infrastructure, and demonstrate that we can produce new (or replacement) warheads on a timescale in which geopolitical threats could emerge, and can respond in a timely way to technical problems in the stockpile, then we can go much further in reducing non-deployed warheads and meet the President's vision of the smallest stockpile consistent with our nation's security.

The vision of our future nuclear weapons posture I have set forth is enabled by what we have learned from ten years of experience with science-based stockpile stewardship, from planning for and carrying out life extension programs for our legacy stockpile, and from coming to grips with national security needs of the 21st century as laid out in the NPR. I hope you find it coherent and compelling. I believe it is the right vision to guide our near term planning and to ensure the nation's long-term security.